



Standard Test Methods for Compounding Materials—Flame Atomic Absorption Technique—Determination of Metals¹

This standard is issued under the fixed designation D 4075; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 These test methods cover the determination of metals in rubber compounding materials by flame atomic absorption.

1.2 The test methods include the following materials:

Zinc oxide

Sections
11 to 20

1.3 *This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* For a specific precautionary statement, see Note 1.

2. Referenced Documents

2.1 ASTM Standards:

D 4004 Test Methods for Rubber—Determination of Metal Content by Flame Atomic Absorption (AAS) Analysis²

D 4483 Practice for Determining Precision for Test Method Standards in the Rubber and Carbon Black Industries²

E 300 Practice for Sampling Industrial Chemicals³

2.2 Other Documents:

2.2.1 Literature pertinent to the particular atomic absorption spectrophotometric equipment used for the analysis especially the manufacturer's recommendations for optimum performance. Standard texts on atomic absorption by flame technique are also helpful.

3. Summary of Test Methods

3.1 The compounding material is suitably sampled, prepared according to the appropriate sections of these test methods, and examined by flame absorption spectrophotometry for metals.

3.2 Sample preparation, procedures, calculations, and precision statements will be found in each section dealing with a particular compounding material.

3.3 The analysis of metals in compounding materials depends on the skill of the operator in the use of the flame atomic absorption equipment. It is, therefore, assumed that the operator is familiar with all aspects of this analytical technique. No details are given here for the proper operation of the equipment or interpretation of results obtained.

3.4 These test methods do not cover the determination of metals in raw rubbers or finished products. See Test Methods D 4004 for these methods.

4. Significance and Use

4.1 These test methods are suitable for process control, for product acceptance, and for research and development.

5. Apparatus

5.1 *Balances*, capable of weighing accurately to ± 0.1 mg or ± 0.1 g, depending on sample mass required.

5.2 *Hot Plate*.

5.3 *Common Borosilicate Glassware*, especially 10, 100, 200 and 500-cm³ volumetric flasks.

5.4 *Pipets*, of 1, 2, 5, and 10-cm³ capacity. One cubic centimetre pipets graduated in tenths and hundredths are especially useful.

5.5 *Microlitre Syringes*, 1 and 10 mm³(μ L) are recommended.

5.6 *Plastic Bottles*, suitable for storage of standard solutions.

5.7 *Atomic Absorption Spectrophotometer* operating in the flame mode. The instrument must be operated according to the manufacturer's directions for optimum performance for flame operation.

6. Reagents

NOTE 1—**Caution:** Observe all recognized health and safety precautions while carrying out this procedure. All reagents shall be of analytical grade, and distilled, deionized, or distilled deionized water shall be used for sample preparation and required dilutions.

6.1 Standard solution for metals to be determined in each compounding material may be prepared from pure metals, metallic compounds, or purchased from a chemical supply house as standard solutions. The usual concentrations of solutions is 1000 μ g of the metal per cubic centimetre of

¹ These test methods are under the jurisdiction of ASTM Committee D11 on Rubber and are the direct responsibility of Subcommittee D11.11 on Chemical Analysis.

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² *Annual Book of ASTM Standards*, Vol 09.01.

³ *Annual Book of ASTM Standards*, Vol 15.05.